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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/565,224

01/20/2006

Michael Zarkh

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EXAMINER

ALLISON, ANDRAE S

ART UNIT

PAPER NUMBER

2624

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/565,224	<b>Applicant(s)</b> ZARKH ET AL.	
	<b>Examiner</b> ANDRAE S. ALLISON	<b>Art Unit</b> 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>02/23/2007; 01/20/2006</u> .                                  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 14 and 16-18 objected to because of the following informalities:
  - a. In claim 14, the abbreviation for the "ECG" should be written out in its entirety.
  - b. In claim 16, the abbreviation for the "QCA" should be written out in its entirety.
  - c. In claim 17, the abbreviation for the "IVUS" should be written out in its entirety.
  - d. In claim 18, the abbreviation for the "LVA" should be written out in its entirety.

Note that the abbreviated version can be placed beside the phrase in bracket for future reference if used in proceeding claims.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
3. Claim 16 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

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described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 16 recite the term "QCA", however, the specification does not provide the meaning of the term. Therefore, one of ordinary skill in the art would not be able to practice this invention without undue experimentation.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 24 recites the limitation "the integral" in line 6. There is insufficient antecedent basis for this limitation in these claims.

Claim 1 and 24 recites the limitation "the cyclic component" in lines 12-13.

There is insufficient antecedent basis for this limitation in these claims.

### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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Claims 1-7, 11-18, 21, 23 and 27-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Nachtomy (US Patent No.: 6,172,878).

As to independent claim 1, Nachtomy disclose a method for obtaining a cyclic motion within a series of images depicting a moving object subject to composite motion containing a cyclic motion component having a cyclic period and a non-cyclic consistent component of a lower frequency than the cyclic component (method for imaging moving organ, while compensating for motion, thus removing distortion and inaccuracies - see column 4, lines 58-65), the method comprising: (a) computing the composite motion between at least one pair of successive images, the composite motion represented by at least one vector (see column 8 lines 64-67 and column 9, lines 1-60 – where the motion of the organ is determine using vectors); (b) computing the non-cyclic component as the integral of the composite motion over the cyclic period (note that global motion is determined - see column 9, lines 45-65), (c) computing a proportional part of the non cyclic component for each of the at least one pair of successive images; and (see column 10, lines 1-30 – where a shift is determined for a first and second images) (d) for each of the at least one pair of successive images, subtracting the proportional part of the non-cyclic component from the composite motion so as to obtain the cyclic component (see column 10, lines 1-30 – where first and second images are compared to determine the motion of the moving organ).

As to claim 2, Nachtomy teaches the method, wherein the cyclic period of the cyclic motion component is computed using spectral analysis (note that the spectrum of

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the first and second images are used to determine motion - see Fig 8a, 8b and Fig 9).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 8-10, 19-21, 24-26 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaum (US Patent No.: 5,959,717).

As to claim 3, Nachtomy does not expressly disclose the method, wherein the composite motion is determined by optical flow. Numbeir discloses a method to detect and quality patient motion wherein the composite motion is determined by optical flow (see abstract). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have modified the method of Nachtomy with the method to detect and quality patient motion Numbeir to control the quality of image acquisition and to alert a user to the potential of reconstruction artifacts due to patient's motion, and to correct for translational motion in the direction of an axis of rotation of an imaging device.

As to claim 4, Nachtomy teaches the method, wherein the composite motion is determined using phase correlation of said images (see column 10, lines 31-62).

As to claim 5, Nachtomy teaches the method, where cyclic motion values are used for evaluating performance of a body organ (e.g. the heart - see column 1-20).

As to claim 6, Nachtomy the method, when used in a cardiac application to evaluate heart performance (e.g. quantify the ability of the lumen of the heart to change under certain condition - see column 3, lines 19-25).

As to claim 7-9, Nachtomy does not expressly disclose the method according to, when used for Ejection Fraction analysis, Left Ventricular analysis and Wall Motion analysis. However, it would be obvious for one skilled in the art to use the above method for Ejection Fraction analysis, Left Ventricular analysis and Wall Motion analysis to provide an overall condition of the heart (OFFICIAL NOTICE).

As to claim 10, note the discussion above, Numbeir teaches the method for identifying an image depicting an event associated with cyclic motion, the method comprising: (a) computing the cyclic motion according to the method of claim 1; (b) using a graphical representation of the cyclic motion to identify all images matching said event; and (c) selecting one of said images (see Fig 5).

As to claim 11, note the discussion above, Numbeir teaches, wherein the selected image is closest to a predetermined approximation (see abstract).

As to claim 12, note the discussion above, Numbeir teaches, wherein the event is least motion (cardiac phantom without motion – see abstract).

As to claim 13, note the discussion above, Numbeir teaches, for selecting angiographic images to participate in three-dimensional reconstruction of coronary vessels (reconstruct a 3D volume of a patient, see page 1, section 1).

As to claim 14, Nachtomy teaches the method, including deriving cycle period and approximation for least-motion image from an analysis of an ECG signal (e.g. Fig 9a).

A method according to claim 15, including distinguishing the end-diastole instance from the end-systole instance by the state of coronary vessel--maximal spreading versus minimal spreading, respectively (see column 20, lines 8-15 where the cardiac periodicity extracted from the closeness curve).

(As best understood) As to claim 16, Nachtomy teaches the method when used for selecting optimal image or images for QCA analysis (the Examiner is interpreting the term QCA to mean Quality Control Analysis) (note that Nachtomy is used for enabling more accurate diagnosis and evaluation, see column 4, lines 55-56).

As to claim 17, Nachtomy teaches the method, when used for selecting optimal



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image or images for IVUS analysis (see column 1, lines 66).

As to claim 18-19, not the discussion of claims 8-9 above.

As to claim 20, note the discussion above, Numbeir teaches when used for CT reconstruction (see abstract).

As to claims 21-23, Nachatomy does not expressly disclose claim 1 when used for MRI and PET reconstruction. However, it would have been obvious for one skilled in the art to have used the above method for MRI and PET reconstruction because MRI and PET are used to image the heart as well as the coronary arteries. Furthermore, both are well know imaging modalities .

Independent claim 24 differ from claim 1 only in that claim 1 is a method claim whereas, claim 24 is a system claim. Thus, claim 24 is analyzed as previously discussed with respect to claim 1 above.

As to independent claim 26, note the discussion of claims 10 and 24 above.

Claims 27-30 differ from claims 12-15 only in that claims 12-15 are method claims whereas, claims 23-30 are apparatus claims. Thus, individual claim 27-30 is analyzed as previously discussed with respect to claim 12-15 above.

***Allowable Subject Matter***

9. Claims 23 and 25 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

***Conclusion***

10. The prior art made part of the record and not relied upon is considered pertinent to applicant's disclosure.

Willame et al (US Patent No.: 7027650), Salla et al (US Patent No.: 7359535), Salla et al (US Patent No.: 7367953), Schweikard et al (US Patent No.: 6501981), Wessels et al (US Patent No.: 6314312), Schweikard et al (US Patent No.: 6144875:) are all cited to disclose method related and apparatus related to processing images of a moving organ.

***Inquires***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDRAE S. ALLISON whose telephone number is (571)270-1052. The examiner can normally be reached on Monday-Friday, 8:00 am - 5:00 pm, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrae Allison

September 12, 2008  
/Jingge Wu/

Supervisory Patent Examiner, Art Unit 2624